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Influence of sulfur compounds on the terrestrial carbon cycle

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Abstract

© 2015, Pleiades Publishing, Ltd. Using the climate model developed at the A.M. Obukhov Institute of Atmospheric Physics, Russian Academy of Sciences (IAP RAS CM), numerical experiments have been conducted in line with the Coupled Model Intercomparison Project Phase 5 (CMIP5), but scaling the anthropogenic emissions of sulfur compounds into the troposphere by ±25%. Two types of impacts of sulfur compounds on climate and the global carbon cycle are considered: climate impact (CI, associated with the influence of tropospheric sulfates on climate and, as a consequence, on the carbon cycle characteristics) and ecological impact (EI, associated with the influence of SO2 on the rate of photosynthesis of terrestrial plants). The climate impact was found to be generally more important than the ecological one. However, in a number of regions, the EI is comparable to CI, including in the southeast parts of North America and, especially, of Asia. The contribution of EI to the change in global characteristics of terrestrial ecosystems in the 20th century is likewise considerable. The CI is generally more sensitive to the uncertainty in anthropogenic emissions of sulfur compounds into the troposphere than the EI.

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Keywords

IAP RAS CM, sulfur dioxide, terrestrial ecosystems, tropospheric sulfates